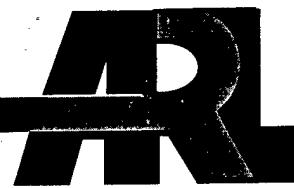ARMY RESEARCH LABORATORY

A Prediction of Soldier Retention of Tactical Unmanned Vehicle (TUV) Tasks

Patricia M. Burcham

ARL-TR-1609   JULY 1998

DTIC QUALITY INSPECTED 1

Excel™ and Windows™ are trademarks of Microsoft Corporation.

Army Research Laboratory
Aberdeen Proving Ground, MD 21005-5425

A Prediction of Soldier Retention of Tactical Unmanned Vehicle (TUV) Tasks

Patricia M. Burcham
Human Research & Engineering Directorate

Abstract

An analysis was performed to predict soldiers' task performance retention (a method for predicting how rapidly individual tasks, once learned, are forgotten over intervals of no practice) of individual tactical unmanned vehicle (TUV) tasks. If retention is low, then periodic sustainment training is necessary to keep soldier task performance high. The more frequently sustainment training is required, the more costly system operations and support become. The User's Manual for Predicting Military Task Retention (ARI, 1985) was used as a guide for rating the individual tasks. Each task was rated for various characteristics known to influence retention. A numerical score was applied to each of ten task characteristics for each individual task. These scores were then totaled and compared to performance prediction tables. The tables revealed the expected proportion of soldiers in a unit able to perform the task correctly in 2 weeks, 12 weeks, and 6 months.

CONTENTS

A PREDICTION OF TASK RETENTION OF THE
TACTICAL UNMANNED VEHICLE (TUV)

INTRODUCTION

The Soldier Systems Control Branch (SSCB) of the Human Research & Engineering Directorate (HRED), U.S. Army Research Laboratory (ARL) was tasked by the Program Manager for Unmanned Ground Vehicles/Systems (PMUGV/S) to conduct an analysis of soldier-marine training retention of tactical unmanned vehicle (TUV) tasks. The analysis was conducted during the risk assessment and reduction phase of the program.

OBJECTIVE

The objectives of this analysis were to predict soldier performance retention of individual tasks of the TUV and to help field trainers and system decision makers make appropriate choices about sustainment training more easily and accurately.

BACKGROUND

The Unmanned Ground Vehicles/Systems Joint Project Office (UGV/S JPO) was formed as a focal point aimed at consolidating the separate efforts of the Department of Defense (DoD), the U.S. Army, and the Marine Corps in developing battlefield robotic ground vehicles.

There is a requirement for the Army and Marine Corps to have an unmanned system serve as a force multiplier to increase effectiveness and survivability of combined arms forces. Unmanned systems operation in hazardous environments reduces force attrition and expands the commander's influence over the battlefield. The TUV provides greatly enhanced soldier-marine combat effectiveness and provides service users with a force multiplier when assets are reduced or eliminated.

The TUV is a joint (USMC and US Army) program. The TUV is scheduled to be fielded in 2004. The U.S. Army Infantry School is the lead proponent. The Marine Corps Combat Development Command (MCCDC) adopted the Army's TUV requirement in May 1996.

The TUV is envisioned to be a relatively small, lightweight, and unmanned mobile ground reconnaissance system. While the vehicle itself is unmanned, there is a control station that is manned. Infantry scouts, forward observers, and reconnaissance teams are planned to

tactically employ the TUV. The intended users are military occupational specialties (MOS) 11B, 19D, and Marine Corps 03 rifleman. The Armed Services Vocational Aptitude Battery (ASVAB) composite rating is combat (CO) with a mental category of IIIB and a cut-off of 90.

The initial mission payload package will be optimized for surveillance, target acquisition, reconnaissance, and advanced warning of nuclear, biological, and chemical (NBC) contaminants on tomorrow's battlefields. The TUV's modular design will facilitate the development of mission payload packages to satisfy emerging future requirements for unmanned systems employment.

The TUV mission planning capability will be taken from the SARGE (not an acronym) system. SARGE is a small teleoperational all-terrain vehicle controlled with an operator control unit (OCU), which is used to perform the basic functions of driving, reconnaissance, navigation, and mission planning.

The SARGE mission planner and navigational displays include a map display, pull-down menus, and a mouse control that exists on a small laptop computer that uses a PC-based computer operating system.

The navigational display (see Appendix A, Figure A-1) exhibits the locations of the mobile base unit (MBU) or teleoperated vehicle in relation to the OCU and friendly or enemy units. The mission planning display allows the operator to plan OCU positioning, final MBU positioning, and waypoint placements. Mission planning also includes the use of radio frequency (RF) and line-of-sight (LOS) analysis.

This report describes the analysis that was performed to predict soldiers' task performance retention (a method for predicting how rapidly individual tasks, once learned, are forgotten over intervals of no practice) of 117 individual TUV tasks. Periodic sustainment training is necessary since soldier task performance deteriorates over time if not practiced on a routine basis. No validated method had been available to help the trainer plan sustainment training based on predetermined levels of proficiency until the American Institutes for Research, under contract to the Army Research Institute (ARI), developed a method that was used to compile this report. The User's Manual for Predicting Military Task Retention was used as a guide for rating the individual tasks. This manual provides information and procedural guidance to predict how rapidly individual tasks, once learned, are forgotten when there is no practice for as long as a year. It guides the user through a method of rating each task in characteristics known to influence retention. These scores were then totaled and compared to performance

prediction tables. The tables revealed the expected proportion of soldiers in a unit able to perform the task correctly in 2 weeks, 12 weeks, and 6 months.

METHODOLOGY

The task performance retention method was performed using TUV task data from two sources, interviews and a function-task breakdown. PMUGV/S support personnel conducted interviews of the Armored Battalion Scouts (19D) of the 2-69th Armored Battalion at Fort Benning, Georgia, to identify TUV mission planning tasks. The interviews focused on the TUV mission plan development, the most complex of all the TUV functions, based on an operations order (OpOrder) from a battalion-level commander. The mission plan included several legs of a route for the TUV MBU and a vehicle-mounted OCU. ARL formulated the navigational tasks that were approved by PMUGV/S (see Appendix B) (Scribner, to be published).

The improved performance research integration tool (IMPRINT), a Windows™-based software package, often used to conduct front end analyses (FEAs) for materiel acquisition programs, was used to develop a complex TUV function and task network. The TUV system functions were derived from a systems engineering functional flow block diagram that was developed at PMUGV/S. The TUV operations and maintenance function and task network were developed in collaboration with ARL and PMUGV/S. This network aided in the understanding of work functions and task breakdown structures. Next, the function and task information was moved from IMPRINT into an Excel™ spreadsheet where task retention ratings could be applied and evaluated (see Appendix B) (ARL, 1998).

The User's Manual for Predicting Military Task Retention recommends the following:

a. Proponent school personnel should rate their proponent tasks since they usually have a detailed knowledge about the tasks.

b. More than one person within a school should rate each task in order to obtain accurate readings.

c. A current, complete, and explicit task summary should be used as the primary reference for rating a given task. It should list conditions under which the task will be performed, standards to be achieved, and performance measures.

The TUV task retention prediction is based on one rater. However, the ratings were reviewed by a TUV task subject matter expert who has performed other work related to TUV tasks. No task summaries were available at the time of this analysis. To date, no prior work has addressed the retention of TUV tasks. This initial analysis was performed using all the available resources.

The method for predicting military task retention requires that each task be rated on its ease of remembrance. The rating is based on characteristics known to influence retention (e.g., memory aids or number of performance steps). One question about each of 10 task characteristics is answered and given a numerical scale value for each task rated. These 10 values are added to yield a task's retention score. The lower the score, the faster the task will be forgotten.

A numerical score was applied to each of the 10 task characteristics that are summarized as follows:

Question 1. Are job or memory aids used by the soldier in performing (and in the performance evaluation of) this task?

Yes	1
No	0

Note: If you selected a "no" answer to this question, go to Question 3.

Question 2. How would you rate the quality of the job or memory aid?

Excellent	56
Very Good	25
Marginally Good	2
Poor	1

Note: If you selected "excellent" for this question, go to Question 6.

Question 3. Into how many steps has the task been divided?

One step	25
Two to five steps	14
Six to ten steps	12
More than ten steps	0

Note: If the task has only one step, go to Question 6.

Question 4. Are the steps in the task required to be performed in a definite sequence?

None are	10
All are	5
Some are and some are not	0

Question 5. Does the task provide built-in feedback so that you can tell if you are doing each step correctly?

Has built-in feedback for all steps	22
Has built-in feedback for most steps (50% and above)	19
Has built-in feedback for only a few steps (as much as 50%)	11
Has no built-in feedback	0

Question 6. Does the task or part of the task have a time limit for its completion?

There is no time limit	40
There is a time limit, but it is fairly easy to meet under test conditions	35
There is a time limit and it is difficult to meet under test conditions	0

Question 7. How difficult are the mental processing requirements of this task?

Almost no mental processing requirements	37
Simple mental processing requirements	28
Complex mental processing requirements	3
Very complex mental processing requirements	0

Question 8. How many facts, terms, names, rules, or ideas must a soldier memorize in order to do the task?

None (or the job/memory aid provides all necessary information)	20
A few (1 to 3)	18
Some (4 to 8)	13
Very many (more than 8)	0

Question 9. How difficult are the facts and terms that must be remembered?

Not applicable - there are none to remember or the job or memory aid provides all the needed information	34
Not difficult at all - the information is simple	31
Somewhat difficult - some of the information is complex	12
Very difficult - the facts, rules, terms, etc., are technical or specific to the task and must be remembered in exact detail	0

Question 10. What are the motor control demands of the task?

Considerable degree of motor control needed	16
Very large degree of motor control needed	3
None	2
Small but noticeable degree of motor control required	0

These scores were totaled for each TUV task and compared to performance prediction tables. The tables revealed the expected proportion (percentage) of soldiers in a unit able to perform the task in a period of weeks or months. These predictions pertain to groups, not to individual soldiers.

Each individual task retention score was then converted into an estimate of unit proficiency in a task after a period of no practice. To convert the retention score to retention prediction, the rater referred to the performance prediction tables in the User's Manual for Predicting Military Task Retention (ARI, 1985). The numbers within the table body represent the expected proportion (expressed in percentage) of soldiers in a unit able to perform a task correctly after a given interval of no practice.

The task rating process does not address the difficulty of learning a task, only the difficulty in retaining it. This process also does not address how to conduct the training.

RESULTS

The TUV individual task retention results are provided in Appendix A of this report. The total score for each TUV task was compared to the performance prediction tables of the User's Manual for Predicting Military Task Retention to obtain an estimate of the percentage of soldiers in a unit able to perform the task correctly in 2 weeks, 12 weeks, and 6 months. These time increments were chosen to demonstrate performance deterioration over time. The most severe degradation for a single TUV task retention prediction was 66% (percentage of soldiers in a unit who would retain the task) for 2 weeks, 8% for 12 weeks, and 0% for 6 months. These severe degradations were all mission planning tasks. Statistical data for TUV training retention are provided in Table 1.

The mean total score for training retention prediction was 156. Comparing this mean with the performance prediction tables, sustainment training should be offered in accordance with Table 2, depending on the proficiency level to be maintained.

Table 1

Statistics for Retention of TUV Tasks

	Total score	Soldiers proficient (percent)		
		2 weeks	8 weeks	6 months
Median	158	94	71	51
Mean	156	92	67	53
Standard deviation	25			
Range	115			

Table 2

Sustainment Training Estimates
(based on the mean total score)

Training frequency (weeks)	Soldiers proficient (percent)
19	50
8	75
4	85

A line graph depicting skill retention (mean) over time is provided in Appendix A, Figure A-2. A frequency histogram of the total scores delineated by function is provided in Appendix A, Figure A-3.

CONCLUSIONS

A total of 177 TUV tasks were analyzed for training retention. Presently, there are no specific requirements for when sustainment training should take place: at 50%, 75%, or 85% performance after an interval of no practice. TUV skill retention shows a rapid decline from 2 to 12 weeks.

Overall, the mission planning tasks appear to be the most difficult, requiring the most training. The tasks involved with system shut-down appear to be the easiest. In comparison of

the mission planning to the system shut-down tasks, memory aids and mental processing requirements seem to be the determining factors for the low and high scores, respectively. Memory aids (e.g., manuals, labels, instructions, checklists, and flow charts) guide or facilitate the soldier in on-the-job performance and in minimizing the need for recall. Mental processing requirements include processes described by terms such as thinking, reasoning, analyzing, and problem solving.

RECOMMENDATIONS

Periodic sustainment training is needed to ensure that soldiers remain proficient in previously learned tasks. However, resources are often limited. The goal is to best employ limited resources to obtain the optimum training reward.

Ideally, training resources should focus only on those tasks that have dropped or are about to drop below the desired level of proficiency.

Choices must be made because it is impossible to continually sustain every soldier on every task. The ratings produced by this method help trainers make choices with greater ease and accuracy. The results produced by this method will be useful to those who must identify which individual tasks to teach and how often to schedule training. This method for predicting military task retention is an efficient way to provide information to the trainers. It is adaptable whereby one can identify tasks and time period of interest to make predictions or set a proficiency criteria level and identify when tasks need to be retrained in order to maintain a certain level of soldier readiness.

Based on the sustainment training estimates, PMUGV/S should emphasize to the TUV proponent (Infantry School, Fort Benning, Georgia) to train the operators no less often than every 19 weeks—optimally, every 4 weeks. The tasks can be reviewed individually for retraining. These data are provided in Appendix A, Table A-1.

REFERENCES

Scribner, D. (to be published). <u>Skill level 10 operations and unit maintenance skills: an examination of tactical unmanned vehicle (TUV) soldier-marine capabilities</u>. Aberdeen Proving Ground, MD: U.S. Army Research Laboratory.

U.S. Army Research Institute (August 1985). <u>User's manual for predicting military task retention</u>. Orlando, FL: Author.

APPENDIX A

FIGURES AND TABLES
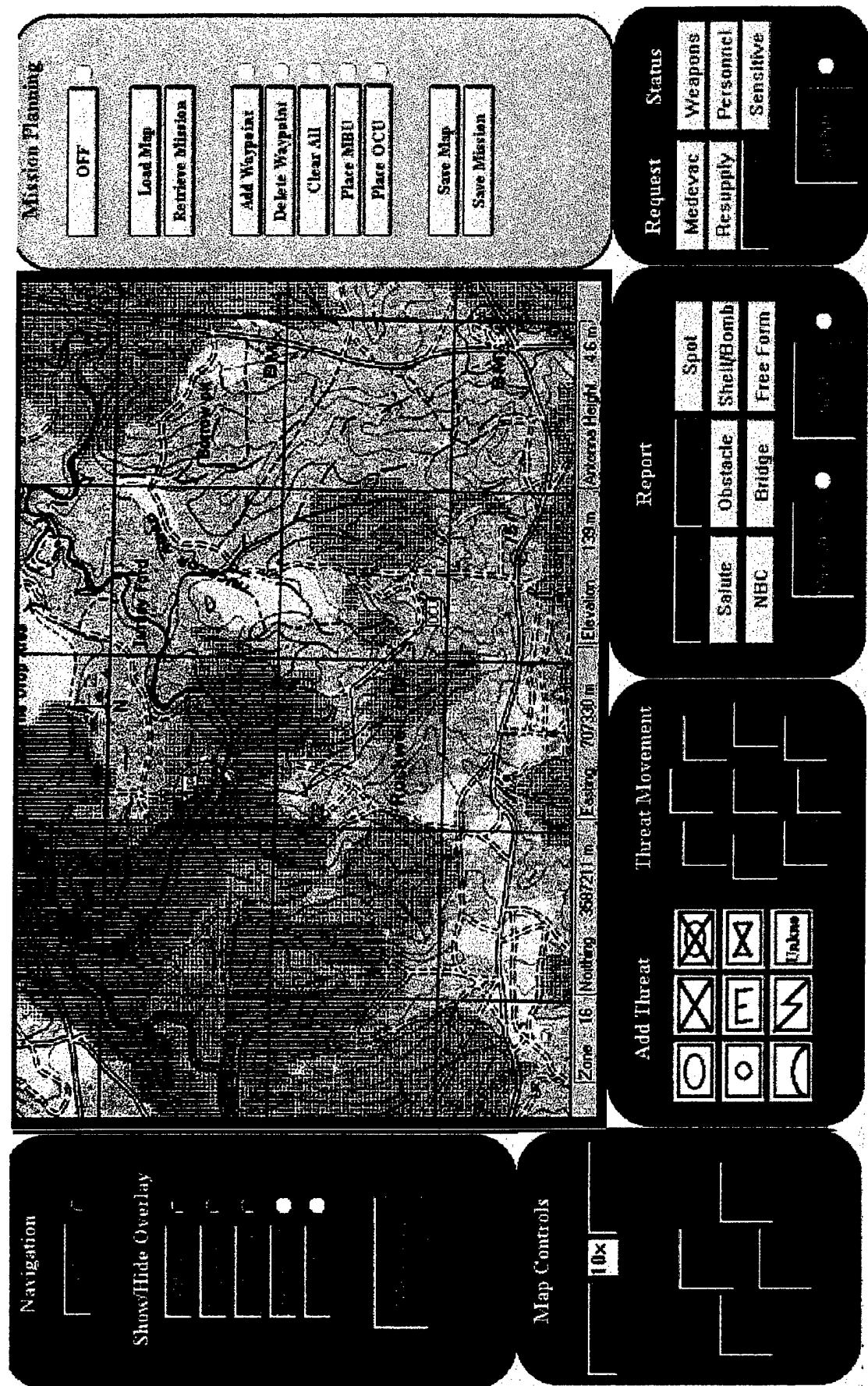
Figure A-1. Navigation interface.
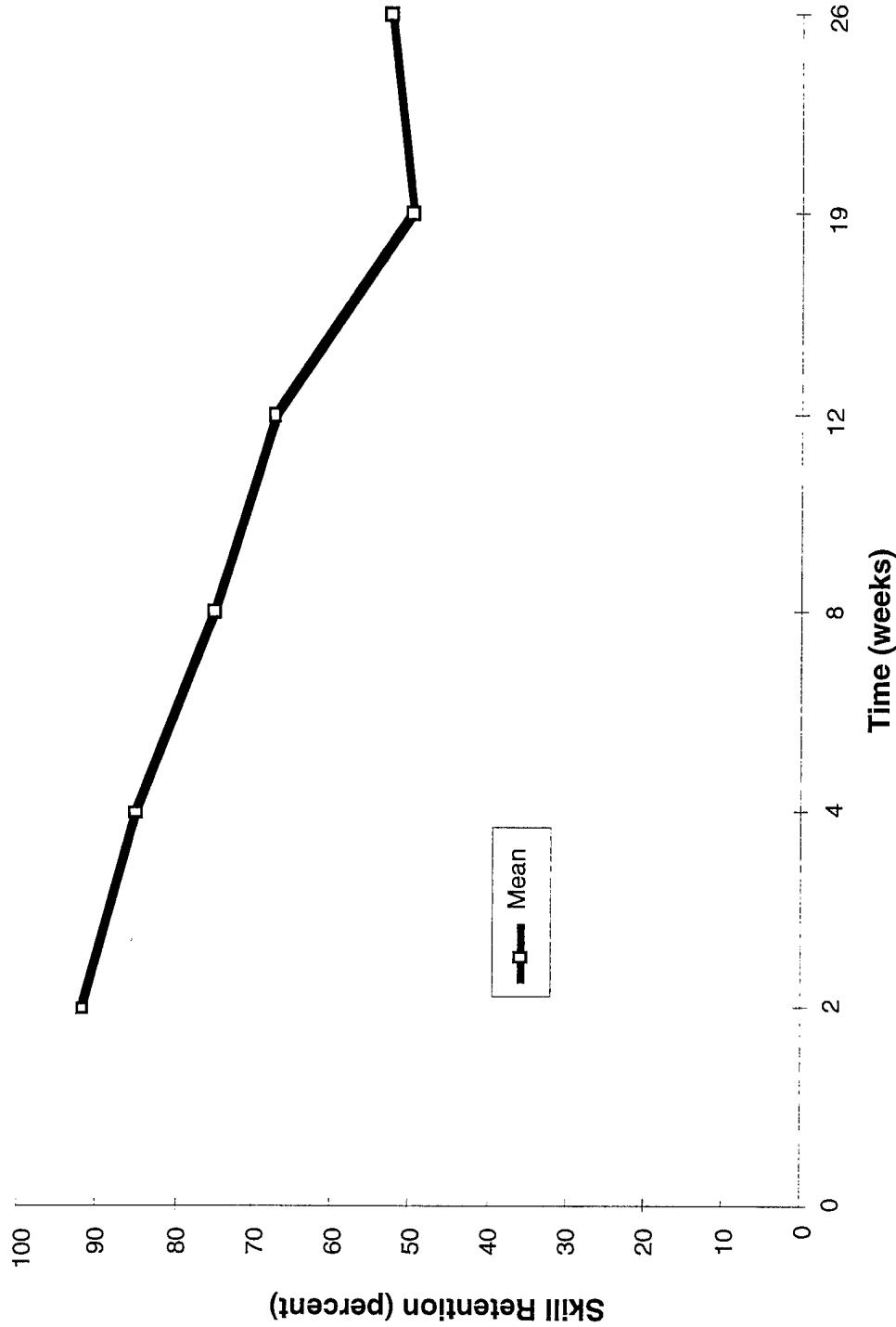
Figure A-2. Training retention for tactical unmanned vehicle.
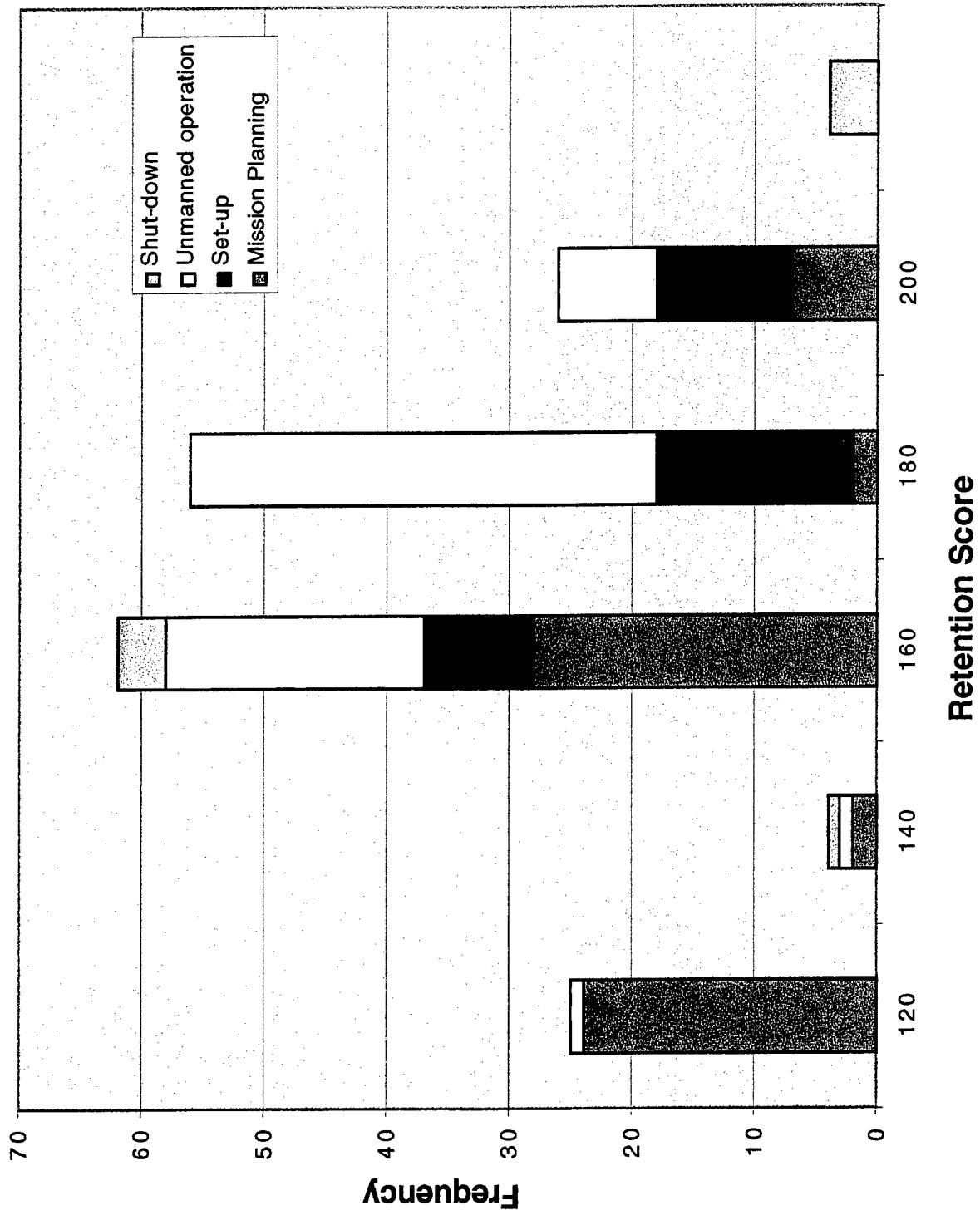
Figure A-3. Retention of tactical unmanned vehicle (TUV) tasks by functions.

APPENDIX A

Table A-1. TUV Training Retention Ratings

FUNCTIONS TASKS — Top Mid Low / Task	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total	2 wks	12 wks	6 mos
Ratings												**% Proficiency**		
7.4 Mission Planning														
7.4.1 Receive Orders*														
7.4.2 Conduct Battle Drills*														
7.4.3 Develop RS/NBC Survey Plan*														
7.4.4 Perform Mission Rehearsals*														
7.4.5 Prepare for Transport*														
7.4.6 Final Checks*														
7.4.7 Assemble Mission Payload*														
7.4.1.1 Receive Orders from Battalion*														
7.4.1.2 Acknowledge Receipt of Orders*														
7.4.2.1 Conduct Battle Drills*														
7.4.3.1 Select Final RSTA Point(s)*														
7.4.3.1.1 Assess Named Areas of Interest (NAI) from OpOrders	1	25	14	5	0	40	3	18	31	0	137	86	40	16
7.4.3.1.2 Place MBU Icon in Final RSTA Area of OCU Map Display	1	25	25	n/a	n/a	40	37	20	34	0	182	100	100	100
7.4.3.1.3 Does MBU LOS & Range Fan Cover NAI?	0	n/a	25	n/a	n/a	40	28	20	34	2	149	91	58	34
7.4.3.1.6 Reposition MBU to Modify LOS and Range Fan Coverage	0	n/a	25	n/a	n/a	40	28	20	34	0	147	89	52	27
7.4.3.1.7 Final RSTA Position Established*														
7.4.3.2.1 Is Fibre Optic Only A Mission Requirement?	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
7.4.3.2.4 Place OCU Icon on OCU Map Display	1	25	25	n/a	n/a	40	37	20	34	0	182	100	100	100
7.4.3.2.5 Concealment OK for LOS RF?	0	n/a	25	n/a	n/a	40	3	18	31	2	119	79	25	6
7.4.3.2.6 Is Distance to MBU OK for LOS RF?	0	n/a	25	n/a	n/a	40	3	18	31	2	119	79	25	6
7.4.3.2.7 Is Terrain OK for LOS RF?	0	n/a	25	n/a	n/a	40	3	18	31	2	119	79	25	6
7.4.3.2.8 Is Enemy Situation OK for LOS RF?	1	25	25	n/a	n/a	40	3	18	31	2	145	89	52	27
7.4.3.2.9 Is Friendly Situation OK for LOS RF?	1	25	25	n/a	n/a	40	3	18	31	2	145	89	52	27
7.4.3.2.14 Is Concealment OK for Fibre Optic?	0	n/a	25	n/a	n/a	40	3	18	31	2	119	79	25	6
7.4.3.2.15 Is Distance to MBU OK for Fibre Optic?	0	n/a	25	n/a	n/a	40	3	18	31	2	119	79	25	6
7.4.3.2.16 Is Terrain OK for Fibre Optic?	0	n/a	25	n/a	n/a	40	3	18	31	2	119	79	25	6
7.4.3.2.17 Is Enemy Situation OK for Fibre Optic?	1	25	25	n/a	n/a	40	3	18	31	2	145	89	52	27
7.4.3.2.18 Is Friendly Situation OK for Fibre Optic?	1	n/a	25	n/a	n/a	40	3	18	31	2	120	79	25	6
7.4.3.2.24 Re-evaluate Position and Try Again*														
7.4.3.2.21 RF Position Established*														
7.4.3.2.22 Fibre Optic Position Established*														
7.4.3.2.23 Final Teleoperation Point Established*														
7.4.3.2.12 OCU Fibre Optic Positioning*														
7.4.3.2 Determine Final Teleoperation Point*														
7.4.3.2.1 Is Fibre Optic Only A Mission Requirement?	1	25	25	n/a	n/a	40	3	18	31	2	145	89	52	27
7.4.3.2.2 Yes*														
7.4.3.2.3 No*														
7.4.3.2.4 Place OCU Icon on OCU Map Display	1	25	25	n/a	n/a	40	37	20	34	0	182	100	100	100
7.4.3.2.5 Concealment OK for LOS RF?	0	n/a	25	n/a	n/a	40	3	18	31	2	119	79	25	6

* Denotes that the task, function, or rating is not applicable to the analysis.

Table A-1. TUV Training Retention Ratings

| FUNCTIONS | | | TASKS | Ratings | | | | | | | | | | Total | % Proficiency | | |
Top	Mid	Low	Task	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10		2 wks	12 wks	6 mos
			7.4.3.2.6 Is Distance to MBU OK for LOS RF?	1	25	25	n/a	n/a	40	3	18	31	2	145	89	52	27
			7.4.3.2.7 Is Terrain OK for LOS RF?	0	n/a	25	n/a	n/a	40	3	18	31	2	119	79	25	6
			7.4.3.2.8 Is Enemy Situation OK for LOS RF?	1	25	25	n/a	n/a	40	3	18	31	2	145	89	52	27
			7.4.3.2.9 Is Friendly Situation OK for LOS RF?	1	25	25	n/a	n/a	40	3	18	31	2	145	89	52	27
			7.4.3.2.10 Yes*														
			7.4.3.2.11 No*														
			7.4.3.2.14 Is Concealment OK for Fibre Optic?	0	n/a	25	n/a	n/a	40	3	18	31	2	119	79	25	6
			7.4.3.2.15 Is Distance to MBU OK for Fibre Optic?	0	n/a	25	n/a	n/a	40	3	18	31	2	119	79	25	6
			7.4.3.2.16 Is Terrain OK for Fibre Optic?	0	n/a	25	n/a	n/a	40	3	18	31	2	119	79	25	6
			7.4.3.2.17 Is Enemy Situation OK for Fibre Optic?	1	25	25	n/a	n/a	40	3	18	31	2	145	89	52	27
			7.4.3.2.18 Is Friendly Situation OK for Fibre Optic?	1	25	25	n/a	n/a	40	3	18	31	2	145	89	52	27
			7.4.3.2.19 Yes*														
			7.4.3.2.20 No*														
			7.4.3.2.24 Re-evaluate Position and Try Again	0	n/a	25	n/a	n/a	40	28	18	31	2	144	89	52	27
			7.4.3.2.21 RF Position Established*														
			7.4.3.2.22 Fibre Optic Position Established*														
			7.4.3.2.23 Final Teleoperation Point Established*														
			7.4.3.2.12 OCU Fibre Optic Positioning*														
			7.4.3.3 Determine Final Teleoperation Route*														
			7.4.3.3.1 Step MBU Back from Present Position	1	25	25	n/a	n/a	40	37	20	34	0	182	100	100	100
			7.4.3.3.2 Have LOS of Previous MBU Location?	0	n/a	25	n/a	n/a	40	3	18	31	2	119	79	25	6
			7.4.3.3.6 Reposition MBU for Proper LOS	1	25	25	n/a	n/a	40	28	18	31	0	168	97	85	72
			7.4.3.3.9 Step OCU Back Behind MBU	1	25	25	n/a	n/a	40	37	20	34	0	182	100	100	100
			7.4.3.3.4 Yes*														
			7.4.3.3.5 No*														
			7.4.3.3.7 Teleoperation Route Leg Completed*														
			7.4.3.3.8 Teleoperation Route Established*														
			7.4.3.4 Establish TUV Section Traveling Formations*														
			7.4.3.4.1 Coordinate MBU Movement Forward 1 Leg	1	25	25	n/a	n/a	40	37	20	34	0	182	100	100	100
			7.4.3.4.2 Coordinate OCU Movement to MBU	1	25	25	n/a	n/a	40	37	20	34	0	182	100	100	100
			7.4.3.4.5 Add Another Mission Leg*														
			7.4.3.4.3 Coordinated Mission Travel Leg Complete*														
			7.4.3.4.4 Coordinated Mission Route Complete*														
			7.4.3.5 Coordinate with Additional Systems*														
			7.4.3.5.1 Establish Secondary Support Mission(s) to other Sections	1	2	14	10	0	40	3	18	12	0	100	66	8	0
			7.4.3.5.2 Create Alternative Route Plan for Alternative Mission	1	2	14	10	0	40	3	18	12	0	100	66	8	0
			7.4.3.6 Prepare Travel Time Estimate*														
			7.4.3.6.1 Begin Travel Time Estimate*														
			7.4.3.6.2 Evaluate Mission	1	2	14	10	0	40	3	18	12	0	100	66	8	0
			7.4.3.6.3 Evaluate Enemy	1	2	14	10	0	40	3	18	12	0	100	66	8	0

* Denotes that the task, function, or rating is not applicable to the analysis.

APPENDIX A

Table A-1. TUV Training Retention Ratings

FUNCTIONS Top Mid Low	TASKS Task	Ratings											% Proficiency		
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total	2 wks	12 wks	6 mos
	7.4.3.6.4 Evaluate Troops	1	2	14	10	0	40	3	18	12	0	100	66	8	0
	7.4.3.6.5 Evaluate Time Available	1	2	14	10	0	40	28	18	12	0	125	81	30	9
	7.4.3.6.6 Evaluate Terrain	1	2	14	10	0	40	3	18	31	0	119	79	25	6
	7.4.3.6.7 Evaluate natural and Intentional Obstacles	1	2	14	10	0	40	3	18	31	0	119	79	25	6
	7.4.3.6.8 Evaluate Terrain Elevations & Slopes	1	2	14	10	0	40	3	18	12	0	100	66	8	0
	7.4.3.6.9 Evaluate Possible Roads, Paths & Trails	1	2	14	10	0	40	3	18	12	0	100	66	8	0
	7.4.3.6.10 Evaluate Ground Surface (Dirt, Mud, Grass, Snow)	1	2	14	10	0	40	3	18	12	0	100	66	8	0
	7.4.3.6.11 Evaluate Foliage (LOS & RF Distances per leg)	1	2	14	10	0	40	3	18	12	0	100	66	8	0
	7.4.3.6.12 Terrain Evaluated*														
	7.4.3.6.13 METT Evaluated*														
	7.4.3.6.14 Estimate Average Speed Over Route	1	2	14	10	0	40	3	18	12	0	100	66	8	0
	7.4.3.6.15 Travel Time Estimate Complete*														
	7.4.3.7 Deliver Brief Back*														
	7.4.3.7.1 Collect Coordinated Mission Plans from Sections	0	n/a	25	n/a	n/a	40	37	20	34	2	158	94	71	51
	7.4.3.7.2 Send Platoon Mission Plan to Battalion	0	n/a	25	n/a	n/a	40	37	20	34	2	158	94	71	51
	7.4.4 Perform Mission Rehearsals*														
	7.4.4.1 Perform Mission Rehearsals*														
	7.4.5 Prepare for Transport*														
	7.4.5.1 Prepare System for Transport*														
	7.4.6 Fin/al Checks														
	7.4.6.1 RS/NBC Survey Plan Completed?														
	7.4.6.2 Mission Payload Correctly Configured for Mission?														
	7.4.6.3 System Ready for Transport?														
	7.4.6.4 Yes*														
	7.4.6.5 Yes*														
	7.4.6.6 Yes*														
	7.4.6.7 No*														
	7.4.6.8 No*														
	7.4.6.9 No*														
	7.4.6.10 Redo Missing Element(s)														
	7.4.7 Assemble Mission Payload*														
	7.4.7.2 A Rangefinder?	0	n/a	25	n/a	n/a	40	28	18	31	2	144	89	52	27
	7.4.7.7 Yes*														
	7.4.7.8 No*														
	7.4.7.9 Mission Package Have the Unit?	0	n/a	25	n/a	n/a	40	28	18	31	2	144	89	52	27
	7.4.7.10 Yes*														
	7.4.7.11 No*														
	7.4.7.12 Leave Unit On Mission Package	0	n/a	25	n/a	n/a	40	28	20	34	2	149	91	58	34
	7.4.7.13 Put Unit on Mission Package	0	n/a	25	n/a	n/a	40	37	20	34	0	156	93	64	42
	7.4.7.23 Rangefinder Done*														

* Denotes that the task, function, or rating is not applicable to the analysis.

Table A-1. TUV Training Retention Ratings

FUNCTIONS			TASKS	Ratings											% Proficiency		
Top	Mid	Low	Task	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total	2 wks	12 wks	6 mos
			7.4.7.14 Mission Package Have the Unit?	0	n/a	25	n/a	n/a	40	28	18	31	2	144	89	52	27
			7.4.7.15 Yes*														
			7.4.7.16 No*														
			7.4.6.17 Remove Unit	0	n/a	25	n/a	n/a	40	28	20	34	2	149	91	58	34
			7.4.7.24 NBC Detection Device Done*														
			7.4.7.25 Day Cameras Done*														
			7.4.7.27 Acoustic Package Done*														
			7.4.7.1 Does the Mission Package Require...	0	n/a	25	n/a	n/a	40	28	18	31	2	144	89	52	27
			7.4.7.26 Night Camera(s) Done*														
			7.4.7.3 An NBC Detection Package?	0	n/a	25	n/a	n/a	40	28	18	31	2	144	89	52	27
			7.4.7.4 Day Camera(s)?	0	n/a	25	n/a	n/a	40	28	18	31	2	144	89	52	27
			7.4.7.5 Night Camera(s)?	0	n/a	25	n/a	n/a	40	28	18	31	2	144	89	52	27
			7.4.7.6 An Acoustic Sensor Package?	0	n/a	25	n/a	n/a	40	28	18	31	2	144	89	52	27
			7.4.7.28 Mission Package Assembled*														
			7.4.7.18 Leave Unit Off Mission Package	0	n/a	25	n/a	n/a	40	28	20	34	2	149	91	58	34
			7.4.7.19 Unit Added or Removed?														
			7.4.7.20 Yes*														
			7.4.7.21 No*														
			7.4.7.22 Add Unit Work Time*														
7.5 Conduct Mission																	
	7.5.1 Move*																
		7.5.1.1 Airdrop*																
			7.5.1.1.1 Rig For Airdrop														
			7.5.1.1.2 LVAD capable														
			7.5.1.1.3 Pack Energy Dissipating Material for LVAD														
			7.5.1.1.4 Provide Secure Points for LVAD Platform														
			7.5.1.1.5 Allow Malfunction Condition Drops														
			7.5.1.1.6 Load on Transport														
			7.5.1.1.7 Transport to Drop Point														
			7.5.1.1.8 Execute Airdrop														
			7.5.1.1.9 De-rig/Assemble														
		7.5.1.2 Air Assault*																
			7.5.1.2.1 Rig for Air Assault														
			7.5.1.2.2 Load on Transport														
			7.5.1.2.3 Transport														
			7.5.1.2.4 Air Insertion														
			7.5.1.2.5 De-rig/Assemble														
		7.5.1.3 Roll-on/Roll-off*																
			7.5.1.3.1 Rig														
			7.5.1.3.2 Load on Transport														

* Denotes that the task, function, or rating is not applicable to the analysis.

APPENDIX A

Table A-1. TUV Training Retention Ratings

TASKS	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total	2 wks	12 wks	6 mos
7.5.1.3.3 Transport														
7.5.1.3.4 Off-load														
7.5.1.3.5 De-rig/Assemble														
7.5.1.4 Amphibious Assault*														
7.5.1.4.1 Rig (amphibious)														
7.5.1.4.2 Load														
7.5.1.4.3 Load on Amphibious Ship														
7.5.1.4.4 Load on Amphibious Landing Craft														
7.5.1.4.5 Transport														
7.5.1.4.6 Off-load (amphibious)														
7.5.1.4.7 De-rig/Assemble														
7.5.1.5 Transport (tow, carry, drive) to Teleop Point*														
7.5.1.5.1 Provide Own Power	0	n/a	25	n/a	n/a	40	37	20	34	2	158	94	71	51
7.5.1.5.2 Provide Transport by HMMWV	0	n/a	25	n/a	n/a	40	28	18	31	2	144	89	52	27
7.5.2 System Set-up*														
7.5.2.1 Prepare MBU*														
7.5.2.1.1 Power Up MBU Main Switch	1	25	25	n/a	n/a	40	37	20	34	2	184	100	100	100
7.5.2.1.2 BIT/BITE Test OK?	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
7.5.2.1.3 Yes*														
7.5.2.1.4 No*														
7.5.2.1.5 Check Status of Driving Cameras	0	n/a	14	10	19	40	28	20	34	2	167	96	78	61
7.5.2.1.6 Check All MBU Status Functions	0	n/a	14	10	19	40	28	18	31	0	160	94	71	51
7.5.2.1.7 Power Down for Another System Check	0	n/a	25	n/a	n/a	40	37	20	34	2	158	94	71	51
7.5.2.2 Ground Mount OCU*														
7.5.2.2.1 Remove OCU from Carrier	0	n/a	25	n/a	n/a	40	37	20	34	2	158	94	71	51
7.5.2.2.2 Carry OCU to Desired Location	0	n/a	25	n/a	n/a	40	37	20	34	2	158	94	71	51
7.5.2.2.3 Set OCU on Ground	0	n/a	25	n/a	n/a	40	37	20	34	2	158	94	71	51
7.5.2.2.4 Open OCU for Use	0	n/a	25	n/a	n/a	40	37	20	34	2	158	94	71	51
7.5.2.3 Prepare OCU*														
7.5.2.3.1 Camouflage OCU	0	n/a	25	n/a	n/a	40	37	20	34	2	158	94	71	51
7.5.2.3.2 Power Up OCU	1	25	25	n/a	n/a	40	37	20	34	2	184	100	100	100
7.5.2.3.3 Check BIT/BITE Status	0	n/a	25	n/a	n/a	40	28	20	34	2	149	91	58	34
7.5.2.3.4 BIT/BITE OK?	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
7.5.2.3.5 Yes*														
7.5.2.3.6 No*														
7.5.2.3.7 Power Down for Another Check	1	25	25	n/a	n/a	40	37	20	34	2	158	94	71	51
7.5.2.3.9 OCU Preparation Complete*	1	25	25	n/a	n/a	40	37	20	34	2	184	100	100	100
7.5.2.3.8 Check Battery Level	1	25	25	n/a	n/a	40	28	18	31	2	170	97	85	72
7.5.2.4 Prepare Mission Payload*														
7.5.2.4.1 Power Up Payload Suite	1	25	25	n/a	n/a	40	37	20	34	2	184	100	100	100

Ratings — Q1 through Q10; % Proficiency — 2 wks, 12 wks, 6 mos.

FUNCTIONS: Top / Mid / Low / Task

* Denotes that the task, function, or rating is not applicable to the analysis.

Table A-1. TUV Training Retention Ratings

| FUNCTIONS | | | TASKS | Ratings | | | | | | | | | | | % Proficiency | | |
Top	Mid	Low	Task	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total	2 wks	12 wks	6 mos
			7.5.2.4.2 Check BIT/BITE Status of Each Payload Module	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
			7.5.2.4.3 BIT/BITE Status OK?	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
			7.5.2.4.4 Yes*														
			7.5.2.4.5 No*														
			7.5.2.4.6 Power Down for Another Check	1	25	25	n/a	n/a	40	37	20	34	2	184	100	100	100
			7.5.2.4.7 Payload Prepared*														
			7.5.2.5 Pre-Operation/PMCS Checks*														
			7.5.2.5.1 Check MBU (Dummy)														
			7.5.2.5.2 Check MBU Fuel Level	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
			7.5.2.5.3 Check MBU Battery Level	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
			7.5.2.5.4 Check MBU Oil Level	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
			7.5.2.5.5 Check MBU Tire Pressure	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
			7.5.2.5.6 Check MBU Hydraulic Fluid	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
			7.5.2.5.7 Check RSTA/NBC Package	0	n/a	14	5	19	40	28	20	34	2	162	94	71	51
			7.5.2.5.8 Check Day Camera Operation	0	n/a	14	5	19	40	28	20	34	2	162	94	71	51
			7.5.2.5.9 Check Night Camera Operation	0	n/a	14	5	19	40	28	20	34	2	162	94	71	51
			7.5.2.5.10 Check Acoustic Package Operation	0	n/a	14	5	19	40	28	20	34	2	162	94	71	51
			7.5.2.5.11 Check Range Finder Operation	0	n/a	14	5	19	40	28	20	34	2	162	94	71	51
			7.5.2.5.12 Check NBC System Operation	0	n/a	25	n/a	n/a	40	28	20	34	2	149	91	58	34
			7.5.2.5.13 Check OCU (Dummy)														
			7.5.2.5.14 Check Data Link Steering	1	25	14	5	19	40	28	20	34	2	188	100	100	100
			7.5.2.5.15 Check Data Link Throttle	1	25	14	5	19	40	28	20	34	2	188	100	100	100
			7.5.2.5.16 Check Data Link Brake	1	25	14	5	19	40	28	20	34	2	188	100	100	100
			7.5.2.5.17 Check OCU Map Display	1	25	14	5	19	40	28	20	34	2	188	100	100	100
			7.5.2.5.18 Check Data Link GPS/UTM Reference System	1	25	14	5	19	40	28	20	34	2	188	100	100	100
			7.5.2.5.19 Check Voice Radio System	1	25	14	5	19	40	28	20	34	2	188	100	100	100
			7.5.2.5.21 Preoperation & PMCS Complete*														
			7.5.3 Unmanned Operation*														
			7.5.3.1 Teleoperate to AO (and Moving NBC Detection)*														
			7.5.3.1.1 Teleoperate to AO (Moving NBC Detection)*														
			7.5.3.1.2 Navigate*														
			7.5.3.1.3 Visually on Course (terrain navigation)?	0	n/a	25	n/a	n/a	40	28	20	34	0	147	89	52	27
			7.5.3.1.6 Yes*														
			7.5.3.1.8 Hold Course	0	n/a	25	n/a	n/a	40	28	20	34	16	163	96	78	61
			7.5.3.1.11 dummy3*														
			7.5.3.1.12 dummy4*														
			7.5.3.1.13 Communicate/Report System Status	1	25	25	n/a	n/a	40	28	18	31	2	170	97	85	72
			7.5.3.1.4 Navigation Position Correct (GPS/UTM/Waypoint)?	1	25	25	n/a	n/a	40	28	18	31	2	170	97	85	72
			7.5.3.1.9 Steer Left	0	n/a	25	n/a	n/a	40	28	20	34	16	163	96	78	61
			7.5.3.1.10 Steer Right	0	n/a	25	n/a	n/a	40	28	20	34	16	163	96	78	61

* Denotes that the task, function, or rating is not applicable to the analysis.

Table A-1. TUV Training Retention Ratings

| FUNCTIONS | | | TASKS | Ratings | | | | | | | | | | | | % Proficiency | | |
Top	Mid	Low	Task	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total	2 wks	12 wks	6 mos
			7.5.3.1.7 No*														
			7.5.3.1.5 Immediate Path Obstacle Free?	0	n/a	25	n/a	n/a	40	28	20	34	2	149	91	58	34
			7.5.3.1.11 Stop MBU	0	n/a	25	n/a	n/a	40	37	20	34	2	158	94	71	51
			7.5.3.1.12 Reverse Until Obstacle Passable	0	n/a	25	n/a	n/a	40	28	20	34	16	163	96	78	61
			7.5.3.1.14 Power Vehicle	0	n/a	25	n/a	n/a	40	37	20	34	2	158	94	71	51
			7.5.3.1.15 Too Fast?	0	n/a	25	n/a	n/a	40	28	20	34	2	149	91	58	34
			7.3.5.1.17 Yes*														
			7.3.5.1.18 Decrease Throttle	0	n/a	25	n/a	n/a	40	28	20	34	16	163	96	78	61
			7.5.3.1.21 dummy2*														
			7.5.3.1.19 Increase Brake	0	n/a	25	n/a	n/a	40	28	20	34	16	163	96	78	61
			7.5.3.1.20 Hold Brake	0	n/a	25	n/a	n/a	40	28	20	34	16	163	96	78	61
			7.5.3.1.18 No*														
			7.5.3.1.22 Too Slow?	0	n/a	25	n/a	n/a	40	28	20	34	2	149	91	58	34
			7.5.3.1.23 Yes*														
			7.5.3.1.25 Increase Throttle	0	n/a	25	n/a	n/a	40	28	20	34	16	163	96	78	61
			7.5.3.1.28 dummy1*														
			7.5.3.1.24 No*														
			7.5.3.1.26 Decrease Throttle	0	n/a	25	n/a	n/a	40	28	20	34	16	163	96	78	61
			7.5.3.1.27 Hold Throttle	0	n/a	25	n/a	n/a	40	28	20	34	16	163	96	78	61
			7.5.3.1.29 Conduct NBC Monitoring*														
			7.5.3.1.30 Detect NBC Contaminants?*														
			7.5.3.1.31 Yes*														
			7.5.3.1.33 Report NBC Information*														
			7.5.3.1.32 No*														
			7.5.3.1.34 Monitor Vehicle Status	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
			7.5.3.1.35 Monitor Fuel Level	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
			7.5.3.1.36 Monitor MBU/OCU Battery Levels	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
			7.5.3.1.37 Monitor Distance Traveled	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
			7.5.3.1.38 Monitor Date	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
			7.5.3.1.39 Monitor Time	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
			7.5.3.1.40 dummy5*														
			7.5.3.1.41 Monitor Vehicle Orientation	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
			7.5.3.1.42 Monitor Vehicle Pitch Angle	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
			7.5.3.1.43 Monitor Vehicle Roll Angle	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
			7.5.3.1.44 Pitch and Roll Angles Acceptable?	0	n/a	25	n/a	n/a	40	28	20	34	2	149	91	58	34
			7.5.3.1.45 Yes*														
			7.5.3.1.46 No*														
			7.5.3.1.51 Hold Course	0	n/a	25	n/a	n/a	40	28	20	34	16	163	96	78	61
			7.5.3.1.47 Steer Right	0	n/a	25	n/a	n/a	40	28	20	34	16	163	96	78	61
			7.5.3.1.48 Steer Left	0	n/a	25	n/a	n/a	40	28	20	34	16	163	96	78	61

* Denotes that the task, function, or rating is not applicable to the analysis.

APPENDIX A

Table A-1. TUV Training Retention Ratings

FUNCTIONS Top/Mid/Low	TASKS Task	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total	% Prof 2 wks	12 wks	6 mos
	7.5.3.1.49 Stop MBU	0	n/a	25	n/a	n/a	40	37	20	34	2	158	94	71	51
	7.5.3.1.50 Reverse Until Pitch and Roll is Acceptable	0	n/a	25	n/a	n/a	40	28	20	34	16	163	96	78	61
	7.5.3.1.52 dummy7*														
	7.5.3.3 RSTA Mission*														
	7.5.3.3.1 RSTA Mission (dummy)*														
	7.5.3.3.2 Power Up all RSTA Systems	1	25	25	n/a	n/a	40	37	20	34	2	184	100	100	100
	7.5.3.3.4 Select Day RSTA Camera	1	25	25	n/a	n/a	40	37	20	34	2	184	100	100	100
	7.5.3.3.5 Night RSTA Camera	1	25	25	n/a	n/a	40	37	20	34	2	184	100	100	100
	7.5.3.3.3 Visual RSTA Systems	1	25	25	n/a	n/a	40	28	20	34	2	184	100	100	100
	7.5.3.3.6 Scan Horizontally	0	n/a	25	n/a	n/a	40	28	20	34	2	175	98	92	85
	7.5.3.3.7 Tilt RSTA Camera to Change Elevation	0	n/a	25	n/a	n/a	40	28	20	34	16	172	91	58	34
	7.5.3.3.8 Detect Target?	0	n/a	25	n/a	n/a	40	37	20	34	16	172	97	85	72
	7.5.3.3.9 Yes*	0	n/a	25	n/a	n/a	40	28	20	34	2	149	91	58	34
	7.5.3.3.10 No*														
	7.5.3.3.11 Need Wider or Tighter View?	0	n/a	25	n/a	n/a	40	28	20	34	2	149	91	58	34
	7.5.3.3.12 Yes*														
	7.5.3.3.13 No*														
	7.5.3.3.14 Zoom In/Zoom Out	1	25	25	n/a	n/a	40	37	20	34	2	184	100	100	100
	7.5.3.3.15 Need Clearer Image?	0	n/a	25	n/a	n/a	40	28	20	34	2	149	91	58	34
	7.5.3.3.16 Yes*														
	7.5.3.3.17 No*														
	7.5.3.3.18 Focus Near/Far	1	25	25	n/a	n/a	40	37	20	34	2	184	100	100	100
	7.5.3.3.19 Identify Target?	0	n/a	25	n/a	n/a	40	28	20	34	2	149	91	58	34
	7.5.3.3.20 Yes*														
	7.5.3.3.21 No*														
	7.5.3.3.22 Communicate/Report Target Contact	1	25	25	n/a	n/a	40	28	18	31	2	170	97	85	72
	7.5.3.3.23 Range Target	1	25	25	n/a	n/a	40	28	18	31	2	170	97	85	72
	7.5.3.3.24 Put Targeting Reticle on Target	1	25	25	n/a	n/a	40	37	20	34	16	198	100	100	100
	7.5.3.3.25 Activate Rangefinder	1	25	25	n/a	n/a	40	37	20	34	2	184	100	100	100
	7.5.3.3.26 Verify Position of Target Data	0	n/a	25	n/a	n/a	40	28	18	31	2	144	89	52	27
	7.5.3.3.27 Transmit Still Image w/GPS/UTM Position Info	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85
	7.5.3.3.28 Call for Fire Needed?	0	n/a	25	n/a	n/a	40	3	18	31	2	119	79	25	6
	7.5.3.3.29 Yes*														
	7.5.3.3.30 No*														
	7.5.3.3.31 Initiate Call for Fire	1	25	25	n/a	n/a	40	3	20	34	2	150	91	58	34
	7.5.3.3.32 Mission Complete?	0	n/a	25	n/a	n/a	40	28	20	34	2	149	91	58	34
	7.5.3.3.35 Mission Completed*														
	7.5.3.3.33 Yes*														
	7.5.3.3.34 No*														
	7.5.3.3.35 Acoustic System	1	25	25	n/a	n/a	40	28	20	34	2	175	98	92	85

* Denotes that the task, function, or rating is not applicable to the analysis.

Table A-1. TUV Training Retention Ratings

FUNCTIONS			TASKS	Ratings											% Proficiency		
Top	Mid	Low	Task	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total	2 wks	12 wks	6 mos
			7.5.3.3.36 Detect Target?	0	n/a	25	n/a	n/a	40	28	20	34	2	149	91	58	34
			7.5.3.3.37 Yes*														
			7.5.3.3.38 No*														
			7.5.3.3.39 Determine Azimuth to Target	1	25	25	n/a	n/a	40	28	18	31	2	170	97	85	72
			7.5.3.3.40 Orient Acoustics to Sound Source	1	25	25	n/a	n/a	40	28	20	34	16	189	100	100	100
			7.5.3.4 NBC Survey Mission*														
			7.5.3.4.1 NBC Survey Mission (dummy)*														
			7.5.3.4.2 Passive Search*														
			7.5.3.4.3 Detect NBC Agents?	0	n/a	25	n/a	n/a	40	28	18	31	2	144	89	52	27
			7.5.3.4.4 Yes*														
			7.5.3.4.5 No*														
			7.5.3.4.6 Classify Contaminant	1	25	25	n/a	n/a	40	28	18	31	2	170	97	85	72
			7.5.3.4.7 Nuclear Contaminant	1	25	25	n/a	n/a	40	28	18	31	2	170	97	85	72
			7.5.3.4.8 Biological Contaminant	1	25	25	n/a	n/a	40	28	18	31	2	170	97	85	72
			7.5.3.4.9 Chemical Contaminant	1	25	25	n/a	n/a	40	28	18	31	2	170	97	85	72
			7.5.3.4.10 Report NBC Information	0	n/a	25	n/a	n/a	40	28	18	31	2	144	89	52	27
			7.5.3.4.10 Active Search*														
			7.5.3.4.12 Mission Complete?	0	n/a	25	n/a	n/a	40	28	20	34	2	149	91	58	34
			7.5.3.4.12 Visual Search*														
			7.5.3.4.13 Scan Horizontally for Round Bursts	0	n/a	25	n/a	n/a	40	28	20	34	16	163	96	78	61
			7.5.3.4.14 Tilt Camera to Change Elevation	0	n/a	25	n/a	n/a	40	37	20	34	16	172	97	85	72
			7.5.3.4.15 Detect Round Burst or Cloud?	0	n/a	25	n/a	n/a	40	28	20	34	2	149	91	58	34
			7.5.3.4.16 Yes*														
			7.5.3.4.17 No*														
			7.5.3.4.18 Note Direction of Burst, Size, Direction of Attack	0	n/a	25	n/a	n/a	40	3	20	34	2	124	81	30	9
			7.5.3.4.19 Yes*														
			7.5.3.4.20 No*														
			7.5.3.4.22 RSTA Mission Complete*														
			7.5.3.5 Teleoperate Back to OCU*														
			7.5.3.6 Drive Forward to MBU*														
			7.5.3.7 Mission Complete (dummy)*														
			7.5.4 System Shutdown*														
			7.5.4.1 Post Operation Checks/PMCS*														
			7.5.4.1.1 All Systems Functional?	0	n/a	25	n/a	n/a	40	28	20	34	2	149	91	58	34
			7.5.4.1.2 Yes*														
			7.5.4.1.3 No*														
			7.5.4.1.4 Repair as Needed	0	n/a	25	n/a	n/a	40	3	20	34	2	124	81	30	9
			7.5.4.1.5 Add Fuel to MBU	1	56	25	n/a	n/a	40	37	20	34	2	215	100	100	100
			7.5.4.1.6 Add Oil to MBU	1	56	25	n/a	n/a	40	37	20	34	2	215	100	100	100
			7.5.4.1.7 Charge MBU Batteries	1	56	25	n/a	n/a	40	37	20	34	2	215	100	100	100

* Denotes that the task, function, or rating is not applicable to the analysis.

Table A-1. TUV Training Retention Ratings

FUNCTIONS			TASKS	Ratings											% Proficiency		
Top	Mid	Low	Task	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total	2 wks	12 wks	6 mos
			7.5.4.1.8 Charge OCU Batteries	1	56	25	n/a	n/a	40	37	20	34	2	215	100	100	100
		7.5.4.2 Stow OCU*																
			7.5.4.2.1 Stow OCU for Transport	0	n/a	25	n/a	n/a	40	37	18	31	2	153	93	64	42
			7.5.4.2.2 Pack Camouflage Netting	0	n/a	25	n/a	n/a	40	37	18	31	2	153	93	64	42
		7.5.4.3 Rig MBU for Travel/Transport*																
			7.5.4.3.1 Rig MBU for Travel/Transport	0	n/a	25	n/a	n/a	40	37	18	31	2	153	93	64	42
7.6 Post Mission Activities*																	

* Denotes that the task, function, or rating is not applicable to the analysis.

NO. OF COPIES	ORGANIZATION	NO. OF COPIES	ORGANIZATION
2	ADMINISTRATOR DEFENSE TECHNICAL INFO CENTER ATTN DTIC DDA 8725 JOHN J KINGMAN RD STE 0944 FT BELVOIR VA 22060-6218	1	DEPUTY COMMANDING GENERAL ATTN EXS (Q) MARINE CORPS RD&A COMMAND QUANTICO VA 22134
1	DIRECTOR US ARMY RESEARCH LABORATORY ATTN AMSRL CS AL TA REC MGMT 2800 POWDER MILL RD ADELPHI MD 20783-1197	1	HEADQUARTERS USATRADOC ATTN ATCD SP FORT MONROE VA 23651
1	DIRECTOR US ARMY RESEARCH LABORATORY ATTN AMSRL CI LL TECH LIB 2800 POWDER MILL RD ADELPHI MD 207830-1197	1	COMMANDER USATRADOC COMMAND SAFETY OFFICE ATTN ATOS (MR PESSAGNO/MR LYNE) FORT MONROE VA 23651-5000
1	DIRECTOR US ARMY RESEARCH LABORATORY ATTN AMSRL CS AL TP TECH PUB BR 2800 POWDER MILL RD ADELPHI MD 20783-1197	1	COMMANDER US ARMY MATERIEL COMMAND ATTN AMCAM 5001 EISENHOWER AVENUE ALEXANDRIA VA 22333-0001
1	DIRECTORATE FOR MANPRINT ATTN DAPE MR DEPUTY CHIEF OF STAFF PERSONNEL 300 ARMY PENTAGON WASHINGTON DC 20310-0300	1	USA BIOMEDICAL RSCH & DEV LAB ATTN LIBRARY FORT DETRICK BUILDING 568 FREDERICK MD 21702-5010
1	CODE 1142PS OFFICE OF NAVAL RESEARCH 800 N QUINCY STREET ARLINGTON VA 22217-5000	1	COMMANDER USA AEROMEDICAL RESEARCH LAB ATTN LIBRARY FORT RUCKER AL 36362-5292
1	WALTER REED ARMY INST OF RSCH ATTN SGRD UWI C (COL REDMOND) WASHINGTON DC 20307-5100	1	US ARMY SAFETY CENTER ATTN CSSC SE FORT RUCKER AL 36362
1	COMMANDER US ARMY RESEARCH INSTITUTE ATTN PERI ZT (DR E M JOHNSON) 5001 EISENHOWER AVENUE ALEXANDRIA VA 22333-5600	1	AIR FORCE FLIGHT DYNAMICS LAB ATTN AFWAL/FIES/SURVIAC WRIGHT PATTERSON AFB OH 45433
1	DEFENSE LOGISTICS STUDIES INFORMATION EXCHANGE ATTN DIRECTOR DLSIE ATSZ DL BLDG 12500 2401 QUARTERS ROAD FORT LEE VA 23801-1705	1	US ARMY TROOP SUPPORT COMMAND NATICK RD&E CENTER ATTN BEHAVIORAL SCIENCES DIV SSD NATICK MA 01760-5020
		1	US ARMY TROOP SUPPORT COMMAND NATICK RD&E CENTER ATTN TECH LIBRARY (STRNC MIL) NATICK MA 01760-5040
		1	MEDICAL LIBRARY BUILDING 148 NAVAL SUBMARINE MED RSCH LAB BOX 900 SUB BASE NEW LONDON GROTON CT 06340

NO. OF COPIES	ORGANIZATION	NO. OF COPIES	ORGANIZATION
1	DR JON FALLESEN ARI FIELD UNIT PO BOX 3407 FORT LEAVENWORTH KS 66027-0347	1	COMMANDER US ARMY MATERIEL COMMAND ATTN AMCDE AQ 5001 EISENHOWER AVENUE ALEXANDRIA VA 22333-0001
1	ARI FIELD UNIT FORT KNOX BUILDING 2423 PERI IK FORT KNOX KY 40121-5620	1	DIRECTOR AMC FIELD ASSISTANCE IN SCI & TECH ATTN AMC FAST (R E FRANSEEN) FT BELVOIR VA 22060-5606
1	COMMANDANT USA ARTILLERY & MISSILE SCHOOL ATTN USAAMS TECH LIBRARY FORT SILL OK 73503	1	ARL HRED AVNC FIELD ELEMENT ATTN AMSRL HR MJ (R ARMSTRONG) PO BOX 620716 BLDG 514 FT RUCKER AL 36362-0716
1	COMMANDER WHITE SANDS MISSILE RANGE ATTN TECHNICAL LIBRARY WSMR NM 88002	1	ARL HRED MICOM FIELD ELEMENT ATTN AMSRL HR MO (T COOK) BUILDING 5400 ROOM C242 REDSTONE ARSENAL AL 35898-7290
1	STRICOM 12350 RESEARCH PARKWAY ORLANDO FL 32826-3276	1	ARL HRED USAADASCH FLD ELEMENT ATTN AMSRL HR ME (K REYNOLDS) ATTN ATSA CD 5800 CARTER ROAD FORT BLISS TX 79916-3802
1	COMMANDER USA TANK-AUTOMOTIVE R&D CENTER ATTN AMSTA RS/D REES WARREN MI 48090	1	ARL HRED ARDEC FIELD ELEMENT ATTN AMSRL HR MG (R SPINE) BUILDING 333 PICATINNY ARSENAL NJ 07806-5000
1	COMMANDER US ARMY RES INST OF ENVIRONMENTAL MEDICINE NATICK MA 01760-5007	1	ARL HRED ARMC FIELD ELEMENT ATTN AMSRL HR MH (J JOHNSON) BLDG 1109B 3RD FLOOR FT KNOX KY 40121-5215
1	INSTITUTE FOR DEFENSE ANALYSES ATTN DR JESSE ORLANSKY 1801 N BEAUREGARD STREET ALEXANDRIA VA 22311	1	ARL HRED CECOM FIELD ELEMENT ATTN AMSRL HR ML (J MARTIN) MYER CENTER RM 3C214 FT MONMOUTH NJ 07703-5630
1	PEO INTEL & ELECTRONIC WARFARE ATTN AMCPEO IEW VINT HILL FARMS STATION BLDG 197 WARRENTON VA 22186-5115	1	ARL HRED FT BELVOIR FIELD ELEMENT ATTN AMSRL HR MK (P SCHOOL) 10115 GRIDLEY ROAD SUITE 114 FORT BELVOIR VA 22060-5846
1	PEO COMMUNICATIONS ATTN SFAE CM RE FT MONMOUTH NJ 07703-5000	1	ARL HRED FT HOOD FIELD ELEMENT ATTN AMSRL HR MV (E SMOOTZ) HQ TEXCOM BLDG 91012 RM 111 FT HOOD TX 76544-5065
1	PEO STRATEGIC DEFENSE PO BOX 15280 ATTN DASD ZA US ARMY STRATEGIC DEFENSE CMD ARLINGTON VA 22215-0280		

NO. OF COPIES	ORGANIZATION	NO. OF COPIES	ORGANIZATION
2	ARL HRED NATICK FIELD ELEMENT ATTN AMSRL HR MQ (M FLETCHER) ATTN SSCNC A (D SEARS) USASSCOM NRDEC BLDG 3 RM R-140 NATICK MA 01760-5015	1	ARL HRED USASOC FIELD ELEMENT ATTN AMSRL HR MN (F MALKIN) HQ USASOC BLDG E2929 FORT BRAGG NC 28307-5000
1	ARL HRED FT HUACHUCA FLD ELEMENT ATTN AMSRL HR MY (B KNAPP) GREELY HALL (BLDG 61801 RM 2631) FORT HUACHUCA AZ 85613-5000	1	US ARMY RSCH DEV STDZN GP-UK ATTN DR MICHAEL H STRUB PSC 802 BOX 15 FPO AE 09499-1500
1	ARL HRED FT LEAVENWORTH FLD ELE ATTN AMSRL HR MP (D UNGVARSKY) TPIO ABCS 415 SHERMAN AVE RM 327 FT LEAVENWORTH KS 66027-1344	2	ABERDEEN PROVING GROUND DIRECTOR US ARMY RESEARCH LABORATORY ATTN AMSRL CI LP (TECH LIB) BLDG 305 APG AA
1	ARL HRED FLW FIELD ELEMENT ATTN AMSRL HR MZ (A DAVISON)* 320 ENGINEER LOOP STE 166 FT LEONARD WOOD MO 65473-8929	1	LIBRARY ARL BLDG 459 APG-AA
1	ARL HRED OPTEC FIELD ELEMENT ATTN AMSRL HR MR (D HEADLEY) PARK CENTER IV RM 1450 4501 FORD AVENUE ALEXANDRIA VA 22302-1458	1	ARL SLAD ATTN AMSRL BS (DR JT KLOPCIC) BLDG 328 APG-AA
1	ARL HRED SC&FG FIELD ELEMENT ATTN AMSRL HR MS (L BUCKALEW) SIGNAL TOWERS RM 207 FORT GORDON GA 30905-5233	1	USMC LIAISON OFFICE ATTN AMSTE ML RYAN BUILDING APG-AA
1	ARL HRED STRICOM FIELD ELEMENT ATTN AMSRL HR MT (A GALBAVY) 12350 RESEARCH PARKWAY ORLANDO FL 32826-3276	1	USATECOM RYAN BUILDING APG-AA
1	ARL HRED TACOM FIELD ELEMENT ATTN AMSRL HR MU (M SINGAPORE) BLDG 200A 2ND FLOOR WARREN MI 48397-5000	1	COMMANDER CHEMICAL BIOLOGICAL AND DEFENSE COMMAND ATTN AMSCB CI APG-EA
1	ARL HRED USAFAS FIELD ELEMENT ATTN AMSRL HR MF (L PIERCE) BLDG 3040 RM 220 FORT SILL OK 73503-5600	1	ARL HRED ERDEC FIELD ELEMENT ATTN AMSRL HR MM (R MCMAHON) BLDG 459 APG-AA
1	ARL HRED USAIC FIELD ELEMENT ATTN AMSRL HR MW (E REDDEN) BLDG 4 ROOM 332 FT BENNING GA 31905-5400		

REPORT DOCUMENTATION PAGE

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE July 1998	3. REPORT TYPE AND DATES COVERED Final

4. TITLE AND SUBTITLE A Prediction of Soldier Retention of Tactical Unmanned Vehicle (TUV) Tasks	5. FUNDING NUMBERS AMS Code 622716.H700011 PR: 1L162716AH70 PE: 6.27.16
6. AUTHOR(S) Burcham, P.M. (ARL)	

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Research Laboratory Human Research & Engineering Directorate Aberdeen Proving Ground, MD 21005-5425	8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Research Laboratory Human Research & Engineering Directorate Aberdeen Proving Ground, MD 21005-5425	10. SPONSORING/MONITORING AGENCY REPORT NUMBER ARL-TR-1609

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.	12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

An analysis was performed to predict soldiers' task performance retention (a method for predicting how rapidly individual tasks, once learned, are forgotten over intervals of no practice) of individual tactical unmanned vehicle (TUV) tasks. If retention is low, then periodic sustainment training is necessary to keep soldier task performance high. The more frequently sustainment training is required, the more costly system operations and support become. The User's Manual for Predicting Military Task Retention (ARI, 1985) was used as a guide for rating the individual tasks. Each task was rated for various characteristics known to influence retention. A numerical score was applied to each of ten task characteristics for each individual task. These scores were then totaled and compared to performance prediction tables. The tables revealed the expected proportion of soldiers in a unit able to perform the task correctly in 2 weeks, 12 weeks, and 6 months.

14. SUBJECT TERMS prediction task performance retention training			15. NUMBER OF PAGES 35
			16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT

NSN 7540-01-280-5500